

Series 31i-B CNC for Milling
STANDARD FEATURES**Axis Control**

Digital Servo Function
1 Controlled Path
3 (up to maximum of 5) Simultaneously Controllable Axes (J801) (J803)
Serial Encoder Interface
Axis Names Selected from X,Y,Z,U,V,W,A,B,C
Least Input Increment of 0.001mm, 0.0001", 0.001deg
Inch/Metric Conversion (J876)
Interlock per Axis
Machine Lock
Emergency Stop
Overtravel Signal
Stored Stroke Check 1
Mirror Image
Follow-up Function
Servo Off
Mechanical Handle Feed
Backlash Compensation
Stored Pitch Error Compensation (J841)

Operation

Memory Operation
DNC Operation
MDI Operation
Program Number Search
Sequence Number Search
Buffer Register
Dry Run Mode
Single Block Mode
Manual Feed Mode (Jog)
Manual Reference Point Return
Manual Handle Feed (J835) (requires MPG)
Incremental Feed

Interpolation

Positioning (G00)
Exact Stop Mode (G61)
Exact Stop (G09)
Linear Interpolation
Circular Interpolation
Dwell (G04)
Helical Interpolation (J819)
Skip Function (G31)
Automatic Reference Point Return (G28, G29)
Reference Point Return Check (G27)
2nd Reference Point Return (G30)

Series 31i-B CNC for Milling**Feed Function**

Rapid Traverse Feedrate 240m/min (100m/min @0.0001mm increment)
Rapid Traverse Feedrate Override (preset value, 25%, 50%, 100% settings)
Feed per Minute
Tangential Speed Control
Cutting Feedrate Clamp
Automatic Acceleration/Deceleration (Rapid Traverse: Linear; Cutting Feed: Linear or Exponential)
Rapid Traverse Bell-Shaped Acceleration/Deceleration
Feedrate Override 0-254%
Jog Override 0-655.34 %
Override Cancel

Programming

EIA/ISO Automatic Identification
Label Skip
Parity Check
Control In/Out
Optional Block Skip
Maximum Programmable Value - 8 digits
Program Number - O with 4 digits
Sequence Number - N with 5 digits
Absolute or Incremental Command
Programmable Data Input (G10)
Decimal Point Input
10 Times Input Unit
Plane Selection (G17, G18, G19)
Rotary Axis Setting
Rotary Axis Rollover
Coordinate System Setting (G92)
Automatic Coordinate System Setting
Manual Absolute On/Off
Subprogram Calling
Canned Drilling Cycles (G73, G74, G76, G80-G89, G98, G99) (J890)
Specifying the Radius of an Arc

Auxiliary and Spindle Functions

Miscellaneous Function - M with 8 digits
Miscellaneous Function Lock
High Speed M/S/T Interface
Multiple Commands of Miscellaneous Functions (up to 3)
Spindle Function - S with 5 digits
Serial Spindle Interface (J850)
Spindle Override 0-254%

Tool Functions and Tool Compensation

Tool Function - T with 8 digits
32 Tool Offsets
Tool Length Compensation (G43, G44, G49)
Tool Radius/Tool Nose Radius Compensation (J930)

Series 31i-B CNC for Milling

Part Program Storage & Editing

256KB Part Program Storage (J945)
63 Stored Part Programs
Part Program Editing
Part Program Protection
Multi Part Program Editing (J956)
Extended Part Program Editing

Display

Status Display
Clock Function
Current Position Display
Program Display
Parameter Setting Display
Self Diagnosis
Alarm Display
Alarm History Display
Help Function
Run Time/Part Count Display (J971)
Actual Cutting Speed Display
Servo Adjustment Screen
System Configuration Display
English Language
Data Protection Key

Data Input/Output and Communications

I/O Link or I/O Link i Interface
Punch Panel with 2m Cable A02B-0236-C192 in LCD Mount, A02B-0120-C192 in Stand Alone.
Reader/Punch Interface 1 (RS-232) (J900)
External Workpiece Number Search
External Data Input (J913)
 includes External Tool Offset
 External Message
 External Machine Origin Shift
 External Program Number Search
Status Output Signal

Other

CD-ROM containing Product Manuals	included in the BOM of the Root CNC
Operation and Maintenance Handbook	B-64487EN FS30i/31i/32i-Model B Oper and Maint Handbook
Miscellaneous conn:	Qty 1 A02B-0120-K324 CONNECTOR AND PINS
	Qty 2 A02B-0120-K301 HONDA CONNECTOR
	Qty 1 A02B-0120-K323 CONNECTOR AND PINS
Spare Fuses	A02B-0236-K100 LCD or A02B-0265-K100 Stand Alone
Cable Clamps	A02B-0303-K001 8 CABLE CLAMPS
Grounding Bar	44B295864-001 GROUNDING BAR 11 SLOT

Series 31í-B CNC for Milling

SERIES 311-B PACKAGE CHOICES

Package A	Package B	
3 Axes 2 Slot Rack LCD Mount Embedded Ethernet 10.4" LCD A Color PMC 24K Steps Serial Spindle CPU Card B2 Basic Function G401 Sep Vert Type MDI Axis Card A11	3 Axes 2 Slot Stand Alone HSSB Embedded Ethernet PMC 24K Steps Serial Spindle CPU Card B2 Basic Function G401 Axis Card A11	G401 => Supports 2 Paths, 12 axes (12 per path), 4 spindles (4 per path) => A02B-0323-C128 or equivalent
PACKAGE DEPENDENT OPTIONS		
PROFIBUS DP Master PROFIBUS DP Slave HSSB Fast Ethernet Data Server 2nd Fast Ethernet Brd	PROFIBUS DP Master PROFIBUS DP Slave Fast Ethernet Data Server Remove HSSB 10.4" LCD A Color Tch 15.0" LCD Col w/ Tch CNC HSSB Card Sep MDI 2nd Fast Ethernet Brd	Automatic Data Back-up, 3 Sets of Back-up Data, SRAM + PPS USB Memory I/O is available on LCD Mount CNCs & the LCD for S.A.

Series 31i-B CNC for Milling

OPTIONS

Series 31i-B CNC Express Package A for Milling - 10.4" LCD Mount w/o Touch Screen.	
Series 31i-B CNC Express Package B for Milling - 2 Slot Stand Alone.	<i>Choose Only 1.</i>
Package A Options	
PROFIBUS DP Master Board (J311, S731, J562#6552)	Choose no more than two
PROFIBUS DP Slave Board (J313, S732, J563#655C)	Option Boards
PROFIBUS Application Software, J535#655B, required for all PROFIBUS	
HSSB Board (High Speed Serial Bus) (J202) (includes Extended D/L Function, 10m F/O cbl)	
1st Fast Ethernet Board (J147) (Requires Ethernet or Data Server)	
Fast Ethernet Function (S707) (Uses FOCAS Protocol)	
Data Server Funct (S737,R953)(req's ATA Flash Mem Card)(Uses FTP for data transfer)	
2nd Fast Ethernet Board (J147) (Additional Ethernet Port) Requires (S707).	
Manual Guide i in Package A - Requires Custom Macro (J873) for full functionality.	
Manual Guide i (S790) 10.4" Color LCD Type A - Large Screen Animation not supported.	
Manual Guide i Multi Path function (S786) - to use on 2nd Path	
Package B Options	
PROFIBUS DP Master Board (J311, S731, J562#6552)	Choose no more than two
PROFIBUS DP Slave Board (J313, S732, J563#655C)	Option Boards
PROFIBUS Application Software, J535#655B, required for all PROFIBUS	
1st Fast Ethernet Board (J147) (Requires Ethernet or Data Server)	
Fast Ethernet Function (S707) (Uses FOCAS Protocol)	
Data Server Funct (S737,R953)(req's ATA Flash Mem Card)(Uses FTP for data transfer)	
2nd Fast Ethernet Board (J147) (Additional Ethernet Port) <i>Req's 1st Ethernet Board & (S707)</i>	
Use HSSB from Package B for the LCD. (Removes A02B-0207-J900) Required to order LCD.	
10.4" LCD A Color w/ Tch Scrn (C084)(290x220mm), J682, Pen & 10m F/O cbl, A02B-0120-K323, A02B-0120-K324, A02B-0319-K191	Only one LCD
15.0" LCD Color w/ Tch Scrn (C092)(400x320mm), J682, Pen & 10m F/O cbl, A02B-0120-K323, A02B-0120-K324	Req MDI below.
CNC Side HSSB Board (incl's A02B-0207-J900, 10m F/O cbl) Requires one Option Slot	
Without Standard CNC Display Unit - HSSB (J389) connects to Panel i or PC side HSSB.	
Without Standard CNC Display Unit - Embedded Ethernet (J390) connects to iPendant only	
Ethernet Display Function (R950 & J573#658N) Embedded Ethernet to PC, not for iPendant	
Sep Type MDI (Vert PC Type) (QWERTY) (290x160mm)	A02B-0323-C128 or equivalent
Sep Type MDI (ONG Type) (Vertical) (290x220mm)	A02B-0323-C126#M or equivalent
Sep Type MDI (ONG Type) (Horizontal) (230x220mm)	A02B-0303-C125#M or equivalent
Manual Guide i in Package B - Requires Custom Macro (J873) for full functionality.	
Manual Guide i (S790)	<i>Only on 1st path of control.</i>
Manual Guide i Multi Path function (S786) - to use on 2nd Path	
10.4" Color LCD A w/ Touch Screen does not support "Large Window Animation" in Manual Guide i.	
High Speed Serial Bus (HSSB) includes: Extended D/L Function J900 & 10m F/O Cable	

Series 31i-B CNC for Milling

SERIES 31i-B MILLING OPTIONS

The following options may be ordered for Packages A or B

Basic Function

	G411 Basic S/W for up to 4 paths, 20 controlled axes, 12 per path, and 6 spindles, 4 per path
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Number of Paths

	Two Control Paths		Minimum of 6 Axes
	Three Control Paths, requires G411 Basic Function		Minimum of 9 Axes
	Four Control Paths, requires G411 Basic Function		Minimum of 12 Axes

Axis Control: up to 20 axes and 6 spindles are possible.

	4th Axis
	5th Axis
	6th Axis
	7th Axis changes to A12 Servo Card, 1 FSSB Servo Line
	8th Axis
	9th Axis
	10th Axis
	11th Axis
	12th Axis
	13th Axis, Requires G411 Basic SW, changes to A13 Servo Card, 1 FSSB Servo Line
	14th Axis
	15th Axis
	16th Axis
	17th Axis
	18th Axis
	19th Axis changes to A24 Servo Card, 2 FSSB Servo Lines
	20th Axis

Number of Serial Spindles (default is one). >1 Spindle per path requires Multi Spindle Control.

	2 Spindles
	3 Spindles
	4 Spindles
	5 Spindles, Requires G411 Basic SW.
	6 Spindles
	Multi Spindle Control. Required if more than one spindle is used per path.

Analog Spindle.

	Analog Spindle (J860) replaces Serial Spindle (J850).		Having Serial Spindle requires R584.
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Serial/Analog Spindle Control - includes Multi Spindle Control.

	1 Serial Spindle and 1 Analog Spindle (R584, J850, J860)
	2 Serial Spindles and 1 Analog Spindle
	3 Serial Spindles and 1 Analog Spindle
	4 Serial Spindles and 1 Analog Spindle, Requires G411 Basic SW.
	5 Serial Spindles and 1 Analog Spindle

Series 31i-B CNC for Milling

Axis Control Options

☐	Axis Control by PMC (up to 16 axes) (J804)
☐	Synchronous Axis Control (up to 6 pairs axes) (J843)
☐	Controlled Axis Detach (J807)
☐	Chopping Function (J707)
☐	Least Input Increment of 0.0001mm, 0.00001", 0.0001deg (J805)
☐	Dual Position Feedback (J704)
☐	Stroke Limit External Setting (J845)
☐	Stored Stroke Check 2 (J840)
☐	Stored Limit Check Before Move (J749)
☐	Interpolation type pitch error compensation (S644)
☐	Bi-directional pitch error compensation (S656)
☐	Straightness Compensation (J747) (4 points)
☐	Interpolation Type Straightness Compensation (S639) (128 points)
☐	Position Switch (J846)
☐	Rotary Axis Control (J743)

Tool Center Point Features

☐	Tool Center Point Control (S677)
☐	Tilted Working Plane Indirect Command (R522)
☐	3-Dimensional Cutter Compensation (S667)
☐	Workpiece Setting Error Compensation (S993)
☐	3-dimensional manual feed (S679)

Operation

☐	Program Restart (J838)
☐	Tool Retract & Recover (J823)
☐	Retrace (J730)
☐	Manual Handle Retrace (J998)
☐	Manual Handle Feed 2/3 Units (J836)
☐	Manual Handle Interruption (J837)
☐	Change Active Offset Value with Manual Move (S825)

Interpolation

☐	Unidirectional Positioning (G60) (J812)	
☐	Polar Coordinate Interpolation (J815)	
☐	Cylindrical Interpolation (J816)	
☐	Thread Cutting and Feed per Revolution (J824)	(requires Spindle Encoder)
☐	High Speed Skip (J848)	
☐	Multi Step Skip (J849)	
☐	3rd, 4th Reference Point Return (J830)	
☐	Normal Direction Control (J813)	
☐	Index Table Indexing (J822)	(requires 4th Axis)
☐	Linear Scale I/F w/ absolute address reference mark (J670). Requires Separate Detector I/F.	

Feed Function

	Bell Shaped Acc/Dec After Interpolation for Cutting Feed (J829)	
	2nd Feedrate Override (J810)	
	Inverse Time Feed (J715)	
	AI Contour Control I (30 Block Look Ahead) (S807)	Choose only one
	AI Contour Control II (200 Block Look Ahead) (S808)	
	Machining Condition Selecting Function (S637) Requires AICC I or AICC II.	

Grinding Options

☐	Canned Cycles for Grinding (J877)
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Series 31i-B CNC for Milling

Programming

☐	Optional Block Skip (total 9) (J955)	
☐	Polar Coordinate Command (J818)	
☐	Workpiece Coordinate System (G52-G59) (J894)	
☐	Additional Work Coordinate System, 48 Pairs (J895)	
☐	Workpiece Coordinate System Preset (J917)	
☐	Optional Angle Chamfering/Corner Rounding (S615)	
☐	Custom Macro (J873)	
☐	Additional Custom Macro Common Variables (J887)	
☐	Interruption for Custom Macro (J874)	
☐	Pattern Data Input (J884)	
☐	Peck Drilling Cycle for Small Hole (J896)	
☐	Scaling (J892)	Choose only one
☐	Automatic Corner Override (J891)	
☐	Coordinate System Rotation (J893)	
☐	Programmable Mirror Image (J880)	
☐	Series 15 Tape Format (J882)	
☐	Macro Executor (J888) 96K Reserved for System S/W.	Choose only one Macro
☐	Macro Executor + C-language Executor (J734) 700K Reserved for System S/W.	
☐	FANUC PICTURE Executor (R644) 2M Reserved for System S/W.	Available with J888/J734.
☐	Custom Software Size 512KB (J738#512K)	Not with J734 or R644.
☐	Custom Software Size 2MB (J738#2M)	Not with R644.
☐	Custom Software Size 4MB (J738#4M)	Choose only one Custom Software Size.
☐	Custom Software Size 6MB (J738#6M)	
☐	Custom Software Size 8MB (J738#8M)	
☐	Custom Software Size 12MB (J738#12M)	

PMC Options

☐	PMC with 32K Steps (H990#32K)	
☐	PMC with 64K Steps (H990#64K)	
☐	PMC with 100K Steps (H990#100K)	Choose Only One.
☐	PMC with 300K Steps (H990#300K)	
☐	Multi-path PMC function (3 paths) (R855#3)	
☐	Multi-path PMC function (5 paths) (R855#5)	Choose Only One.
☐	PMC symbol, comment, and message capacity expansion (512KB) (R856#512K)	
☐	PMC symbol, comment, and message capacity expansion (1MB) (R856#1M)	
☐	PMC symbol, comment, and message capacity expansion (2MB) (R856#2M)	Only One.
☐	Function Block Function (R852)	
☐	I/O Link expansion 2nd Channel w/ A20B-1007-0680 and 1m cable.	
☐	I/O Link expansion 3rd Channel w/ A20B-1008-0360 and 1m cable.	
☐	Dual Check Safety (S661) Req's I/O Link i, I/O Link 3rd Channel or PROFIBUS Master.	
☐	I/O Link i will be used for Dual Chack Safety.	Check here:

Auxiliary and Spindle Functions

☐	1st Spindle Orientation (J853) (Applies to 1st Spindle per Path)	(req's Serial Spindle)
☐	Constant Surface Speed Control (J855)	(requires Spindle Encoder)
☐	2nd Miscellaneous Function (B8-digit binary) (J920)	
☐	Rigid Tapping (J828)	(Analog Spindle req's Spindle Encoder.)
☐	Retraction for Rigid Tapping (J664)	
☐	See Drives Tab for Spindle Separately Mounted Position Encoder.	

Series 31i-B CNC for Milling

Tool Functions and Tool Compensation

☐	64 Tool Offset items (J925)	Assignable by parameter per path.	
☐	99 Tool Offset items (J926)		Choose only one
☐	200 Tool Offset items (J927)		
☐	Tool Offset Memory C (D/H code, Geometry/Wear) (J937)		
☐	Tool Offset (S617)		
☐	Tool Life Management (J935)		
☐	Automatic Tool Length Measurement (S618)		

Part Program Storage & Editing Total PPS in the system, available to all paths.

☐	512KB Part Program Storage (J946) (Approx 1280m)		
☐	1MB Part Program Storage (J947) (Approx 2560m)		Choose only one
☐	2MB Part Program Storage + 1000 Stored Part Programs (J948) (J953) (Approx 5120m)		
☐	4MB Part Program Storage + 1000 Stored Part Programs (J949) (J953) (Approx 10240m)		
☐	8MB Part Program Storage + 1000 Stored Part Programs (J959) (J953) (Approx 20480m)		
☐	Playback (J879)		
☐	Machine Time Stamp (J964)		

FANUC Picture

☐	FANUC Picture Function (S879) Req's LCD w/ Tch Pnl, deletes J682, not w/ J734/J888/R644		
☐	FANUC Picture Function for non-Touch panel display (S944)		Not w/ J734, J888 or R644

Ethernet or HSSB Options

☐	Use Embedded Ethernet for BOP2 or Ladder Edit Function		
☐	Basic Operation Package (BOP2) Function (J814) & CD		(Also works w/ embedded Ethernet)
☐	CNC Screen Display Function (J858)		
☐	Application Disk for HSSB		
☐	Application Disk for Ethernet		
☐	CNC Screen Dual Display Function (S884)		
☐	CNC Screen Display for 19" Panel i (R624)	19" Panel i requires one of these options	
☐	Enlarged CNC Screen Display for 19" Panel i (R673)		
☐	Ladder Edit Function (J820)		(Also works w/ embedded Ethernet)
☐	Ethernet/IP Adapter Function (R967), requires Ethernet (S707)		
☐	Ethernet/IP Scanner Function (R966), requires Ethernet (S707)		

Display

☐	Graphic Display (J972)	Requires LCD or CNC Screen Display Function	
☐	Software Operator Panel (J960)		
☐	Software Operator Panel General Purpose Switch (J961)		
☐	Selection of Five Optional Language (R521)		
☐	Touch Panel Control (J682)	Req'd when iPendant w/ Touch Screen is the only display.	

Data Input/Output and Communications

	You may overwrite the QTY fields for qty >1	Qty
☐	Compact Flash Card 128MB, Card Adapter B	
☐	Compact Flash Card 1GB (suggested for use with Data Server) , 2 Card Adapters	
☐	2nd Reader/Punch Interface (RS-232) (J901)	

Series 31i-B CNC for Milling

Parallel Axis Tracking

Parallel Axis Tracking (S895) is the tracking of the W/Z Zero position when W and Z axis are parallel axes. Activated by G-Code. Applicable to popular Horizontal Boring Machines. Requires J888, J738#256K, J894, J917 & at least 4 axes. Includes DVD and Manual.

i AdaptS

Check to override required DVD.

i AdaptS (S898) maintains a constant load during part processing by modifying the feedrate override. This allows for the fastest possible cycle time based on the condition of the tool, part geometry and material variation. By maintaining the manufacturer's recommended load on the tool, tool life can also be extended. i AdaptS works on the first serial spindle in the first path only. Req's J873, J810, J738#2M, J734.

i AdaptS S/W DVD D75F-0102-PB00

i AdaptS S/W DVD with FANUC Picture (R644). Req's R644 >= J738#6M. D75F-0103-PB00.

Cables

Optional: Replace 10m cable for LCD orderable with Package B with one of the following:

Fiber Optic Cable, CNC to LCD, 1m

Fiber Optic Cable, CNC to LCD, 5m

Fiber Optic Cable, CNC to LCD, 20m

Different MDI's

Separate Type MDI (ONG) (Vertical)

A02B-0303-C126#M or equivalent

Replaces Vertical QWERTY in Pkg A

Separate Type MDI (ONG) (Horizontal)

A02B-0303-C125#M or equivalent

(do not order with Pkg B)

Product Manuals

Series 30i/31i/32i-B Descriptions

Series 30i/31i/32i-Model B Connection Manual Hardware

Series 30i/31i/32i-Model B Connection Manual (Function)

Series 30i/31i/32i-Model B Maintenance Manual *

Series 30i/31i/32i-Model B Parameter Manual *

Series 30i/31i/32i-B User's Manual Common & Maching Center*

Series 30i/31i/32i FAST Ethernet/Data Server Operator's Manual

Manual Guide i Operator's Manuals & Setup Guide

Series 30i/31i/32i Model B Operation and Maintenance Handbook